

Answer the questions in the spaces provided on the question sheets. If you run out of room for an answer, continue on the back of the page.

Name and section: _____
Instructors name: _____

1. Evaluate these the differentials

(a)

$$\frac{d}{dx} (A \cos (3x^2))$$

[1]

(b)

$$\frac{d}{dx} (x^2 \cos (3x^2))$$

[2]

(c)

$$\frac{d}{dx} (A(x)^{-1} \cos (3x^2))$$
$$A(x) = x^2 - x$$

[3]

(d)

$$\psi(x) \frac{1}{2m} \frac{d^2}{dx^2} (\psi(x))$$
$$\psi(x) = e^{-\frac{x}{2}}$$

[3]

(e)

$$\frac{d^2}{dx^2} \left(\frac{3x^2}{\ln(x^3)} \right)$$

[2]

(f)

$$\frac{d^2}{dxdy} \left(3x^2 \sin \left(\frac{x}{x+1} + y^2 \right) \right)$$

[4]

2. Hows does Gibbs energy relate to reaction driving force?

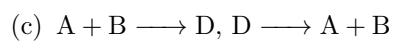
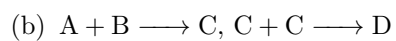
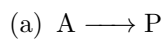
[1]

3. What factors can make a reaction unfavourable?

[1]

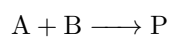
4. The rate of a reaction is not constant in time but depends upon other factor. What are these factors? [1]

5. How would the following reactions be classified? [3]



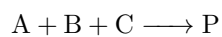
6. Describe collision theory? What factor are important to consider how likely a reaction is [2]

7. How can this reaction be expressed as a rate law? (Write the expression) [2]



8. What is the order of the previous questions reaction? [1]

9. How can this reaction be expressed as a rate law? (Write the expression) [2]



10. How do the Van't Hoff and Initial rate methods differ? [2]

11. Derive the rate law using integration from the rate [3]

$$-\frac{d[\text{CO}_2]}{dt} = k[\text{CO}_2]$$

12. Derive the rate law using integration from the rate

[3]

$$-\frac{d[\text{CO}_2]}{dt} = k[\text{CO}_2]^3$$

13. How can multiple reagents be treated to find the rate of the reaction?

[2]

14. How does the pseudo rate constant used in dealing with multiple reagents differ from the standard definition?

[2]

15. Under what conditions should steady state be used and what conditions should pre-equilibrium be used?

[2]

16. Given that at 25° the rate is 0.2 and that at 40° the rate is 1.2. Assuming it is elementary what is the activation energy?

[4]

$$k = Ae^{-\frac{E_{ac}}{RT}}$$